

Geothermal Heats Up in Connecticut

By Valerie Bannister

Renewable energy for home heating, cooling and hot water exists right under our feet.

As energy costs and environmental concerns increase, interest in geothermal heat pumps is on the rise in Connecticut. Besides saving money on operating costs, it's one of the greenest ways to keep homes comfortable. Higher installation costs are offset over time by energy cost savings.

Geothermal heat pumps take advantage of the relatively constant temperature below ground by pulling heat into the home in winter and extracting it in summer. The system pumps fluid (antifreeze and/or water) through underground pipes. The fluid absorbs heat, which is compressed and warms the air circulated in the house. In summer, the system acts in reverse.

The system consists of a unit in the house and underground pipes that create an earth loop. Some systems use closed loops buried vertically, horizontally or in a pond. Others circulate water from an underground well or surface water.

Systems typically use electricity

to run the fan, compressor and heat pump unit.

Geothermal systems use 40 to 60 percent less energy than conventional installations, according to the Connecticut Geothermal Association (CGA) trade group.

Nearly 40 percent of the United States' carbon dioxide (CO₂) emissions, a greenhouse gas, is attributed to heating and cooling buildings, and providing hot water. This is about the same amount as transportation emissions, according to the U.S. Department of Energy, Office of Geothermal Technologies as stated on the website of the Geothermal Exchange Organization (GEO), a national trade group.

Over one million installations exist in the United States, according to the GEO. The U.S. Department of Energy reports that there are about 50,000 units installed each year nationwide.

In Connecticut, about seven to 10 percent of heating and cooling installations, mostly residential, are geothermal, says Guy Wanegar of A&B Cooling and Heating of South Windsor. His company began install-



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ing systems in 1995, says Wanegar, former CGA president. At first, it installed four or five, but now does about 50 a year. Geothermal installations make up 95 percent of his business, with 70 percent done for new construction and 30 percent for retrofits.

The reason for the increased interest is both monetary and environmental. "I think people are getting tired of fluctuating gas prices," says Wanegar. The systems don't burn fuel, so the house has no carbon footprint, he says.

The cost of a system in a new home is generally 20 to 30 percent more than conventional systems, says Wanegar. In the average home of 3,000 square feet, a conventional system might be \$20,000 to \$30,000, while geothermal would cost about \$35,000 to \$45,000.

Geothermal might cost more to install, but pays for itself over time, says Wanegar. Operating costs are about 30 to 70 percent less than conventional fuels, with natural gas at the lowest end and oil at the other, he says. In a 3,000-square-foot house, the cost of geothermal might be \$120 a month, he says.

Installation costs aren't expected to come down, according to Wanegar. Equipment costs are not extravagant and drilling costs, which must take into account the cost of diesel fuel, are fixed, he says.

About 90 percent of the systems Wanegar's company installs use vertical loops, due to the rocks and ledge in Connecticut, and use closed loops for "efficiency reasons," says Wanegar.

Wanegar's interest in geothermal was piqued at a Northeast Utilities seminar in the early 1990s. "This makes perfect sense," he thought. "It's perfectly clean and there's no storage of fuel.

"I think everyone should have one, but it's not for every house,"

says Wanegar. An old, drafty farmhouse would not be appropriate. "It would never see a reasonable payback," he says.

But it is appropriate for the tight structures being built today, says

An old drafty farmhouse would not be appropriate for geothermal as it would never see a reasonable payback.

Wanegar. His company can do energy and cost analyses, he says.

Nordic Builders of Tolland has seen interest grow; a third of their recent homeowners opted for geothermal, says owner Liz Koiva.

One of Nordic's recent customers, Dipen Shah, moved into his 4,300-square-foot Tolland home in 2013. He loves the geothermal system and chose it to go green and for the savings, which will add up over the 15-plus years he intends to stay in the house. In summer, he averages \$150 a month for electricity and cooling and the most it cost was \$500 during the coldest month, he says.

It does appear more buyers are talking about geothermal now than in previous years, he wrote. "The federal tax credit is a great incentive for buyers to inquire into the topic," he says. "Although the initial cost can get pricey, buyers with a long-term plan will see their savings add up over time."

Since 1982, Celebration Construction and Development Corporation of Madison has been installing geothermal systems, says owner Wil-

liam Freeman. Initially, he installed them sporadically. "Now, almost every new home is geothermal," he says. He averages about four systems a year. "The most common is a closed-loop, vertical system," he says.

provides a one-time tax credit of 30 percent on the cost of systems installed after 2008 and before 2016. Energize Connecticut offers Connecticut Light and Power and United Illuminating customers a rebate of \$500 to \$1,500.

As homes are built tighter, smaller units are required, which also reduces the cost of a system, says Freeman.

Geothermal systems are considered low-maintenance, but should be checked regularly, as with any other system. "I've never had a client call and say they had a problem," says Freeman.

Valerie Bannister is a freelance writer based in Chester.

Federal tax credits and rebates help reduce the cost of geothermal systems. The federal government

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